we shall give a few quotations from the book, in order to show at once the tone of thinking which more or less pervades the whole, and the pleasing style in which it is conveyed.

> "There are some considerations on the very threshold of the question which appear to throw the balance of likelihood strongly on the side of natural causes, however difficult it may be to say what these causes were. The production of the organic world is, we see, mixed up with the production of the physical. It is mixed in the sense of actual connection and dependence, and it is mixed in regard to time, for the one class of phenomena commenced whenever the other had arrived at a point which favoured or admitted of it; life, as it were, *pressed in* as soon as there were suitable conditions, and, once it had commenced, the two classes of phenomena went on, hand in hand, together. It is surely very unlikely, *a priori*, that in two classes of phenomena, to all appearance perfectly coordinate, and for certain intimately connected, there should have been *two totally distinct modes of the exercise of the divine power*," &c. (p. 148).
>
> "There is certainly no express reason to suppose that, although life had been imparted by natural means after the first cooling of the surface to a suitable temperature, it would have continued thereafter to be capable of being imparted in like manner. . . . We are rather to expect that the vital phenomena presented to our eye should mainly, if not entirely, be limited to a regular and unvarying succession of races by the ordinary means of generation. This, however, is no more an argument against a time when phenomena of the first kind prevailed, than it would be proof against the fact of a mature man having once been a growing youth that he is now seen growing no longer" (p. 168).

Notwithstanding this, however, the writer immediately begins coquetting with a number of very seductive facts and considerations in favour of spontaneous—or, as he more correctly terms it, "non-parental generation." In particular he lays great stress upon the "Crossian experiment" of producing acari by the action of a voltaic battery on a solution of silicate of potash. And here we have a very good special illustration of the difference between Chambers and Darwin. The former, as a literary man, states the experiments, weighs the evidence which they yield, and, without actually accepting the fact as proved, is on the whole strongly disposed to believe it. The latter, as a man of science, would have spent a lifetime in verifying so all-important a fact, even if the evidence of it had appeared to him of but a tenth part of the weight that it appeared to Chambers. Here, however, it is but fair to Chambers, as a literary man, to say that he does not in this place, or anywhere else, attach more than its due value to the evidence of any alleged fact. He merely gives the evidence for what it may be worth, and then passes on. Therefore he is careful to make it clear that whether or not all the considerations which he adduces in favour of "non-parental generation" are valid, the question of its actual occurrence is really a side issue, and does not affect the course of his general argument in favour of the evolution of species by way of "parental generation." This clearness of logical view is further and particularly well displayed in his consideration of Lamarck's theory touching the causes of the evolution of species: although Chambers is exceedingly anxious to find these causes, so that it might "appear as if the clouds were beginning to give way, and the light of simple, unpretending truth were about to break upon the great mystery," yet he critically puts his finger upon the weak points of the theory in question, and ends by dismissing it as inadequate to explain the facts (p. 233 *et seq.*).

One other quotation may be given as an example of the general common sense which the writer every now and then pours out, like a viscid secretion, wherewith to entangle and render helpless his opponents.

> "It may be well to mark the credulity to which the adherents of immutability must here be reduced. They must believe that the Creator, having a particular regard to the fact of molluscan shells lying useless on the shore, formed, by special care or fiat, a family of crabs to occupy them. They must believe that the roughness of the caudal appendages, the development of suckers along the abdomen, the reduction of the two hind pairs of limbs, and the left pincer-claw, were all subjects for this special care, and were beyond the power of what an eminent geologist calls 'vulgar nature.' Surely the *Deus ex machinâ* was never more remarkably exemplified. See, on the other hand, how these facts are accounted for on the development theory. According to this new light, the hermit-crabs are simply a portion of some greater section of the crustacean class. Their peculiarities are modifications from the parent form, brought about in the course of generations, in consequence of an appetency which had led these creatures to seek a kind of shelter in turbinate shells" (p. 54).

It only remains to say that this, the no doubt final edition of the "Vestiges of Creation," is very prettily got up, and leaves nothing to be desired as to printing, &c. We feel, however, that it would have been well worth while to have had the reprint edited by some competent naturalist, who might have inserted footnotes to warn the general reader against the numerous pitfalls which are to be encountered on matters of fact. As it is, the general reader cannot possibly know what he is to accept as scientifically-established truth, and what he is to reject as superseded error. This we think is a pity in the interests of the book itself, because during its author's lifetime the successive editions were successively brought up to date in the matter of keeping pace with the progress of science. Lastly, in the appendix, written by the author himself in reply to criticisms, we must not fail to note the magnanimous temper, dignified style, and forcible reasoning, which contrast so favourably with the opposites of these things in the quotations which he has occasion to make from the more celebrated among his critics.

GEORGE J. ROMANES

NATTERER'S BRAZILIAN MAMMALS

Brasilische Sangethiere. Resultate von Johann Natterer's Reisen in den Jahren 1817 bis 1835. Dargestellt von August von Pelzeln. (Wien, 1883.)

THE collections of the celebrated Brazilian traveller and naturalist, Johann Natterer, owing to his untimely death shortly after his return to Europe, lay almost unnoticed for many years in the Imperial Cabinet at Vienna. At length Herr August von Pelzeln, after several years' unremitting study of the unrivalled collection of birds, published in 1871 his "Ornithologie Brasiliens"—well known to ornithologists as one of the most important authorities on the Brazilian avifauna. More recently the same laborious naturalist has devoted his attention to Natterer's mammals, and in the memoir now before us, of

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which the second part has just been issued, has given us an excellent summary of Natterer's discoveries in this class of animals.

During his ten journeys in the Brazilian Empire (of which the first was commenced at Rio in November 1817, and the last terminated at Parà in September 1835) Natterer collected no less than 1179 examples of mammals, all most carefully prepared and accurately labelled, with notes of sex, colours of soft parts, date, and locality. These are referred by von Pelzeln to 205 species, 73 of which were new to science when first obtained by this unrivalled collector.

Natterer had planned a general work on the mammals of Brazil, in conjunction with Andreas Wagner. After the former's untimely death in 1843, Wagner published descriptions of the new genera and species in Wiegmann's *Archiv* and other periodicals, and introduced notices of them into his well-known supplement to Schreber's "Saugethiere." But we have now for the first time a complete systematic account of the whole of Natterer's collection with exact localities.

As might have been expected, the dense forest-region mostly traversed by Natterer was especially productive of Quadrumana—the American group of this order being exclusively arboreal in their habits. No less than 265 specimens of American monkeys were obtained, referable to 45 species, 4 of which were new to science. Of Chiroptera, Natterer procured examples of 48 species, of which at least 25 were first discovered by him. It should be also noted that the very singular structure of the stomach of the bloodsucking *Desmodi*, first made known by Prof. Huxley in 1865, was, as is testified by his note-books, previously discovered by Natterer in 1828!

The Carnivores are not so numerous in the Brazilian forests as the two preceding orders. Only 17 species were met with by Natterer, and only one of these (*Lutra solitaria*) was first made known to us by his specimens. The Rodents, on the other hand, are very abundant in species as in individuals in this part of South America. Not less than 50 species are represented in Natterer's series, whereof 24 were previously unknown to science.

The Ungulates are not abundant in South America, the true Ruminants being only represented by some peculiar forms of the deer family (Cervidæ). Of these Natterer obtained examples referable to 5 species. Besides the deer the only Ungulates met with were a tapir (*Tapirus americanus*) and the two well-known species of peccary.

Of the Sirenia, Natterer met with a manatee high up the stream of the Amazons, in the Rio Negro, Rio Brancho, and Madeira, and maintains in his notes that the species which inhabits these far inland waters is quite different from the *Manatus americanus* of the South American coast. Natterer called it *Manatus inunguis*, from its nailless fingers, and sent home to the Imperial Cabinet of Vienna three complete specimens and several skulls. Of the Cetaceans, Natterer met with two species of dolphin in the Amazons and its tributaries. *Inia amazonica* was found in the Guaporé and Madeira, and two examples obtained, and a head of *Steno tucuxi* was brought home from Barra de Rio Negro. Interesting notes are given on the structure of both these little-known animals.

We now come to the Edentata, which, as is well known, are well represented in the Neotropical Region by the three families of sloths, armadillos, and anteaters. Of each of these peculiar forms Natterer obtained a fine series. Among the sloths the two-toed *Cholopus didactylus* was met with on the banks of the Rio Negro and its tributaries, while of the three-toed genus *Bradypus* examples were collected which are referred by Herr von Pelzeln to five species. Of armadillos, Natterer obtained examples of five species, including the giant *Cheloniscus gigas;* he likewise procured specimens of all the three known species of anteaters.

South America is also rich in the smaller opossums, which constitute the only family of extra-Australian Marsupials, and amongst them this assiduous collector reaped a rich harvest. Of 18 species of which he sent home specimens not less than 11 were previously unknown to science, and were mostly described by Andreas Wagner under Natterer's manuscript names. It may, indeed, be safely affirmed that no naturalist, unless our countryman, John Gould, in the case of his celebrated expedition to Australia, be a possible exception, has ever been equally successful with Johann Natterer in discoveries amongst the higher classes of animals, and it is probable that no future naturalist, however great be his industry, will ever surpass him in the number and variety of his discoveries or in the excellence of his specimens.

OUR BOOK SHELF

A Treatise on Chemistry. By H. E. Roscoe, F.R.S., and C. Schorlemmer, F.R.S., Professors of Chemistry in the Victoria University, Owens College, Manchester. Vol. III. Organic Chemistry, Part II. (London: Macmillan and Co., 1884.)

THE first part of this volume, treating of the hydrocarbons of the paraffin series, and the alcohols, ethers, bases, acids, &c., derived therefrom, has already been reviewed in this journal (vol. xxv. p. 50). The part now under consideration treats of a large number of compounds derived from the di-, tri-, tetra, and hex-atomic alcohol-radicals, and from the monatomic alcohol-radicals of the series C_nH_{2n-1}; also of the carbohydrates, sugar, starch, gum, cellulose, &c., and of the furfuryl, meconic acid, and uric acid derivatives. Many of these bodies, *e.g.* the carbohydrates, and oxalic, lactic, malic, tartaric, citric, and uric acids, are of great importance as constituents of vegetable and animal organisms, and for their applications in arts and manufactures. The extraction and purification of sugar, from the cane and from beet, are clearly and fully described in this volume, and illustrated by excellent woodcuts of the apparatus and machinery used; also the estimation of sugar in juices, &c., by the optical or polarimetric method. Descriptions and illustrations are also given of the manufacture of starch, of the uses of cellulose in its various forms, cotton, flax, hemp, &c., and of the manufacture of paper.

Altogether the part now under consideration forms a very valuable portion of Roscoe and Schorlemmer's "Treatise," and we hope that the publication of the remaining parts—which will treat of the benzene-derivatives or aromatic bodies, and of the proximate constituents of the animal organism—will not be long delayed. The portions already published afford a guarantee that the volume when finished will form one of the most complete treatises on Organic Chemistry yet published in the English language.

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